CLAIMS

What is claimed is:

1. A system for identifying anomalous targets comprising:

one or more imaging subsystems to generate track files from an image comprising targets;

an image processing subsystem to extract features from the track files; and

a discrimination subsystem to generate a probabilistic belief function from the extracted features for generating an output indicating that at least some of the targets are anomalous.

2. The system of claim 1 wherein the targets comprise cells and the image comprising the targets is an image of a tissue sample, and wherein the discrimination subsystem generates the belief function from the extracted features and known anomalous cells to provide a probability that at least some of the cells are anomalous.

3. The system of claim 1 wherein the imaging subsystem generates the track files from either photographs or scanned images of tissue samples that includes cells.

4. The system of claim 1 wherein the imaging subsystem generates the track files from optical data of cells collected either by a microscope or a microscopic-imaging camera, the cells being collected from a tissue sample.

5. The system of claim 1 wherein the imaging subsystem generates the track files from optical data to comprise an array of elements to represent the image, each array element to include at least two-dimensional (2D) imaging components, and each array element to further include a velocity component and a rotational component to represent respectively velocity and rotation of targets exhibiting velocity and/or rotation within the image,

wherein the velocity component represents movement of a target within a field-of-view of the image, the rotational component represents rotational movement of a target within the field-of-view of the image.

6. The system of claim 1 wherein the imaging subsystem generates the track file from optical data to comprise an array of array elements to represent the image, each array element to include three-dimensional (3D) imaging components generated from images at a plurality of two-dimensional focal planes.

7. The system of claim 1 wherein the imaging subsystem generates a plurality of two-dimensional (2D) images of the sample targets at various depths to generate three-dimensional (3D) imaging components of the track file for the image.

8. The system of claim 1 wherein the imaging subsystem generates the track file from images retrieved from a remotely-located database of images of tissue samples over a network, the images comprising cells.

9. The system of claim 1 wherein the image processing subsystem extracts features from targets using the track file and generates feature sets for the targets, the feature sets to indicate at least one of motion, rotation, target size, target shape, target outline, ratio of target size to other targets, and ratio of size of predetermined elements.

10. The system of claim 9 wherein the image processing subsystem further identifies the targets within the image using the track files, and generates the feature sets for the identified targets.

11. The system of claim 10 wherein the image processing subsystem further generates a descriptor associated with each feature set of each identified target to indicate when the target at least meets a criteria for the associated feature set.

12. The system of claim 11 wherein the image processing subsystem includes a morphological filter perform morphological filtering on the identified targets, the filtering to exaggerate features for identified targets meeting a criteria for a feature set.

13. The system of claim 12 wherein the image processing subsystem identifies target cells having normal-sized nuclei, the morphological filter attenuates the normal-sized nuclei and darkens nuclei of target cells having larger than normal-sized nuclei.

14. The system of claim 12 wherein the image processing subsystem generates a morphed image file with the exaggerated features for displaying a morphed image to an operator to help the operator identify anomalous targets.

15. The system of claim 9 wherein the features sets are stored remotely and are accessed over a network.

16. The system of claim 9 wherein the discrimination subsystem generates the belief functions for at least one of a selected feature set of the identified targets, the belief functions being generated from the at least one selected feature set of the identified targets within the image.

17. The system of claim 16 wherein the belief functions are initial belief functions generated from known anomalous targets as part of a supervised training process.

18. The system of claim 17 wherein the discrimination subsystem updates the initial belief functions as part of an unsupervised training process based on measurable characteristics of the targets identified by the image processing subsystem.

19. The system of claim 18 wherein the initial belief functions and associated feature sets are stored in a remotely located belief function database for use by other systems.

20. The system of claim 16 wherein the discrimination subsystem provides revised feature sets to instruct the image processing subsystem to repeat extracting features for the revised feature sets based on belief functions results.

21. A cancerous-cell identification system comprising:

an imaging subsystem to generate track files from one or more images of a tissue sample;

an image processing subsystem to extract features of cells from the track file; and

a discrimination subsystem to generate a probabilistic belief function from the extracted features for generating an output indicating that at least some of the cells within the one or more images are cancerous.

22. The system of claim 21 wherein the image processing subsystem extracts features from individual cells using the track file and generates feature sets for the individual cells, the feature sets to indicate at least one of either cell motion, cell rotation, cell size, cell shape, cell outline, ratio of individual cell size to average cell size, and ratio of nucleus size to cytoplasm.

23. The system of claim 22 wherein the image processing subsystem further generates a descriptor associated with each feature set of each identified cell to indicate when an identified cell at least meets a criteria for the associated feature set, and wherein the discrimination subsystem generates the belief functions for at least one of a selected feature set of the identified cells, the belief functions being generated from the at least one selected feature set of the identified cells within the image to indicate when at least some of the cells are cancerous.

24. The system of claim 22 wherein the belief functions are initial belief functions generated from the tissue samples having known cancerous cells as part of a supervised training process, and wherein the discrimination subsystem updates the initial belief functions as part of an unsupervised training process based on measurable characteristics of the cells identified by the image processing subsystem.

25. A method for identifying anomalous targets comprising:

generating track files from an image comprising targets;

extracting features from the track file; and

generating a probabilistic belief function from the extracted features for generating an output indicating that at least some of the targets are anomalous.

26. The method of claim 25 wherein the targets comprise cells, and the image comprising the targets is an image of a tissue sample, and wherein generating comprises generating the belief function from the extracted features and known anomalous cells to provide a probability that at least some of the cells are anomalous.

27. The method of claim 26 further comprising:

extracting features from targets using the track file;

generating feature sets for the targets, the feature sets to indicate at least one of target motion, target rotation, target size, target shape, target outline, ratio of target size to other targets, and ratio of size of predetermined elements; and

using the track file to identify targets within the image having features associated with the feature sets.

28. The method of claim 27 further comprising performing morphological filtering on the identified targets, the filtering to exaggerate features for identified targets meeting a criteria for a feature set.

29. The method of claim 28 further comprising identifying target cells having normal-sized nuclei, and wherein morphological filtering attenuates the

normal-sized nuclei and darkens nuclei of target cells having larger than normal-sized nuclei.

30. The method of claim 27 further comprising generating the belief functions for at least one of a selected feature set of the identified targets, the belief function being generated from the at least one selected feature set of the identified targets within the image.

31. An article comprising a storage medium having stored thereon instructions, that when executed by a computing platform, result in:

generation of track files from an image comprising targets;

extraction of features from the track file; and

generation of a probabilistic belief function from the extracted features for generating an output indicating that at least some of the targets are anomalous.

32. The article of claim 31 wherein the instructions, when further executed by the computing platform result in:

extraction of features from targets using the track file;

generation of feature sets for the targets, the feature sets to indicate at least one of target motion, target rotation, target size, target shape, target outline, ratio of target size to other targets, and ratio of size of predetermined elements; and

use of the track file to identify targets within the image having features associated with the feature sets.